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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Unit - 1
Docket No. 50-313
License No, DPR-51
Licensee Event Report 50-313/2001-004-00

Gentlemen:

In accordance with 10CFR50.73(a)(2)(iv)(A), enclosed is the subject report concerning an automatic reactor trip. The enclosure contains no commitments.

Very truly yours,

Glenn R. Ashley
Manager, Licensing

GRA/tfs

enclosure

cc: Mr. Ellis W. Merschoff
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NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Arkansas Nuclear One Unit 1	05000313	1 OF 4

TITLE (4) Automatic Reactor Trip On High Reactor Coolant System Pressure Due To Failure Of A Card In The Main Turbine Electro-Hydraulic Control System

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	24	2001	2001	004	00	09	20	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR: (Check one or more) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(3)(i)		50.73(a)(2)(i)(C)		50.73(a)(2)(vii)
			20.2201(d)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(A)
			20.2203(a)(1)		20.2203(a)(4)		50.73(a)(2)(ii)(B)		50.73(a)(2)(viii)(B)
			20.2203(a)(2)(i)		50.36(c)(1)(i)(A)		50.73(a)(2)(iii)		50.73(a)(2)(ix)(A)
			20.2203(a)(2)(ii)		50.36(c)(1)(ii)(A)	X	50.73(a)(2)(iv)(A)		50.73(a)(2)(x)
			20.2203(a)(2)(iii)		50.36(c)(2)		50.73(a)(2)(v)(A)		73.71(a)(4)
			20.2203(a)(2)(iv)		50.46(a)(3)(ii)		50.73(a)(2)(v)(B)		73.71(a)(5)
			20.2203(a)(2)(v)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(C)		OTHER
			20.2203(a)(2)(vi)		50.73(a)(2)(i)(B)		50.73(a)(2)(v)(D)		Specify in Abstract or NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
T. F. Scott, Nuclear Safety and Licensing Specialist	501-858-4623

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	[redacted]	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	JJ	CTR	W120					

SUPPLEMENTAL REPORT EXPECTED (14)			EXPECTED SUBMISSION DATE (15)	MO	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

ABSTRACT (16)

An automatic reactor trip occurred on high Reactor Coolant System pressure due to rapid closure of the Turbine Generator governor valves. All control rods fully inserted and no Engineered Safety Features actuations occurred. The root cause was determined to be failure of a chip in the reference up-down counter card in the Electro-Hydraulic Control (EHC) System. Another card in the EHC System was also found to have failed. A common failure mode could not be identified. The unit returned to power operation after the cards were replaced. An EHC reliability study is being conducted to determine the need for system upgrades and improved maintenance strategies. This event had minimal safety significance. There have been no previous similar events reported by Arkansas Nuclear One as Licensee Event Reports.

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NARRATIVE (17)

A. Plant Status

At the time of this event, Arkansas Nuclear One Unit 1 (ANO-1) was operating in steady-state conditions at 100 percent power.

B. Event Description

An automatic reactor trip occurred due to a malfunction of the Electro-Hydraulic Control (EHC) [JJ] System of the Turbine Generator [TA].

At approximately 0600 on July 24, 2001, the plant experienced a small increase in generated megawatts (MW) and a decrease in steam header pressure. Control Room Operators noticed that the setter display for the Turbine Generator EHC controls appeared to be locked up but the reference display appeared to be responsive. After the transient, the plant stabilized. System Engineering was notified and was requested to provide troubleshooting assistance. At 0639, a second transient began with indications similar to the earlier occurrence. As the plant started to stabilize, generated MW decreased rapidly due to rapid closure of the turbine governor valves. The Reactor Protection System (RPS) [JC] initiated an automatic reactor trip on high Reactor Coolant System (RCS) [AB] pressure. The trip was not complicated. No actuation of Engineered Safety Features (ESF) [JE] systems occurred, and all control rods [AA] fully inserted. Once Through Steam Generator (OTSG) [AB] safety valves opened, as expected, for a short period. The unit was promptly stabilized in hot shutdown conditions with temperature controlled by turbine bypass valves [JI] and OTSG water level controlled by the Main Feedwater System [SJ]. Following an investigation into potential causes of the event, the reactor was critical at 0322 on July 25, 2001. Reactor power was maintained at approximately five percent while troubleshooting continued. At 0403 on July 26, 2001, the Turbine Generator was tied to the grid, and the unit reached full power at 2300 that same day.

C. Root Cause

The root cause for the abnormal governor valve movement and subsequent plant trip was a failure of the reference up-down counter card in the EHC System. This counter is responsible for the governor valve demand signal. A failure of the setter up-down counter card also occurred. The timing of the setter counter card failure is uncertain and may have happened earlier than the reference counter card failure. However, the failure of the setter counter had no direct impact on the plant trip since

it only tracks the reference counter during load control. The counter chip for the hundreds digit failed on both cards, and each card exhibited erratic behavior. The failures were confirmed by bench testing. No circuit related link to the two failures could be identified. The only interaction between the two cards besides the power supply is the digital comparator card on the counter card outputs. A review of the comparator circuit revealed no failure mode that could have resulted in the counter card failures. Both counter cards showed signs of excessive heat that may have accelerated the probability of failures. Deficiencies involving loose connections and high resistance on signal and power grounds were found during troubleshooting on the EHC cabinet; however, these conditions are not believed to be related to the card failures.

D. Corrective Actions

The failed up-down counter cards were part number 2822A8G01 style TTL supplied by Westinghouse (Manufacturer W120). The original cards had been part number 398522 style HTL. The type card that failed had a dropping resistor and voltage regulator that added additional heat. The older style HTL cards were used as replacements.

Other immediate actions included checking of other EHC circuits for failures, checking EHC cabinets for noise or grounds, tightening loose connections, and testing power supplies.

An EHC equipment reliability study is being conducted. Results of this study will be utilized to determine the need for system upgrades and improved maintenance strategies.

E. Safety Significance

Safety systems operated as designed following the trip and the plant was safely placed in stable hot shutdown conditions. The RPS functioned properly and there were no actuations or conditions warranting actuation of any ESF system. Therefore, this event had minimal safety significance.

F. Basis for Reportability

The automatic RPS actuation is being reported pursuant to 10CFR50.73(a)(2)(iv)(A). This condition was reported to the NRC Operations Center pursuant to 10CFR50.72(b)(2)(iv)(B) at 0900 CDT on July 24, 2001.

LICENSEE EVENT REPORT (LER)

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NARRATIVE (17)

G. Additional Information

There have been no previous similar events reported by ANO as Licensee Event Reports (LERs).

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].